

removing a gaseous component of a gas stream, comprising incorporating an intermetallic reagent in a filter, the intermetallic reagent being effective to bind with a gaseous component of a gas stream sufficiently to selectively remove the gaseous component from the gas stream. The invention further relates to a method of removing a gaseous component from a gas stream, comprising passing the gas stream in contact with a filter comprising an intermetallic reagent which binds with a gaseous component of the gas stream and removes the gaseous component from the gas stream.

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B The filter can comprise a cigarette filter attached to a tobacco rod by tipping paper or the intermetallic reagent can be incorporated in one or more cigarette filter parts such as filter paper, shaped paper insert, a plug, a space, or a free-flow sleeve. The intermetallic reagent can comprise nanometer or micrometer size clusters of a transition metal or alloy containing a transition metal or a transitional metal salt. The transition metal can include iron and/or titanium and the intermetallic reagent can comprise nanometer or micrometer size clusters of an iron aluminide or a titanium aluminide. Preferably, the intermetallic reagent is a non-oxide intermetallic reagent or a crystalline intermetallic reagent.

The intermetallic reagent can be incorporated in or on a support material. The support material can comprise silica gel, porous carbon or a zeolite. According to a preferred embodiment, the intermetallic reagent selectively binds to unsaturated hydrocarbons in the gas stream and selectively removes the unsaturated hydrocarbons from the gas stream. A metal atom of the intermetallic reagent can bind to a C-H bond and/or a C-C bond of the gaseous component. The gaseous component to be removed from the gas stream can be an unsaturated hydrocarbon such as 1,3-butadiene, isoprene and/or toluene.

The intermetallic reagent can be incorporated in cigarette filter paper located within a free-flow filter, the filter paper optionally having a three-dimensional shape and/or the filter paper being a liner on the interior of a hollow tubular element. The intermetallic reagent can be incorporated with cellulose acetate fibers and/or polypropylene fibers forming a plug or a free-flow filter element.

According to a method of the invention, the filter can be attached to a tobacco rod with tipping paper or the intermetallic reagent can be incorporated in one or more cigarette filter parts selected from shaped paper insert, a plug, a space or a free-flow sleeve. According to a preferred method, a step of attaching the filter paper within a free-flow filter of a cigarette can comprise forming the filter paper into a three-dimensional shape, or attaching the filter paper as a liner on the interior of a hollow tubular element, or combining the intermetallic reagent with fibers and forming a filter element from the intermetallic reagent and fibers, or combining the intermetallic reagent with cellulose and/or polypropylene fibers and forming a plug or free-flow filter element, or incorporating the intermetallic reagent in a cavity of the filter. The intermetallic reagent can be loaded in or on a support material forming a filter element of the filter.

The gas stream can be formed by burning tobacco and directing tobacco smoke through the filter or one or more filter parts such that the component of the gas stream to be removed is brought into contact with the intermetallic reagent and prevented from reentering the gas stream.

According to a preferred method, where the porous support comprises silica gel, the silica gel can have an average particle diameter of at least 10 μm or the silica gel can be in